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Infra-red radiating gas burners for glass-ceramics cooking decks - has natural effect exhaust for combustion gases through slits cut in sheet of cooking deck (Eng)

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The infrared radiating body (2) is mounted on a metal deck (1) and covered by a glass-ceramics surface (4). Inside is the outlet of at least one gas feeding pipe (3,3a) controlled by a corresponding knob.

The combustion area coinciding with the outlets (3,3a), is communicated to the environment through slits (12) uniformly distributed on a peripheral wall (11) of the burner. This results in the combustion exhaust gases, before discharge to the environment, flow around the bottom of a cooking container on the plate, transferring additional heat by convection.

ADVANTAGE - Uniform and efficient heat transfer. (6pp Dwg.No.2/2)

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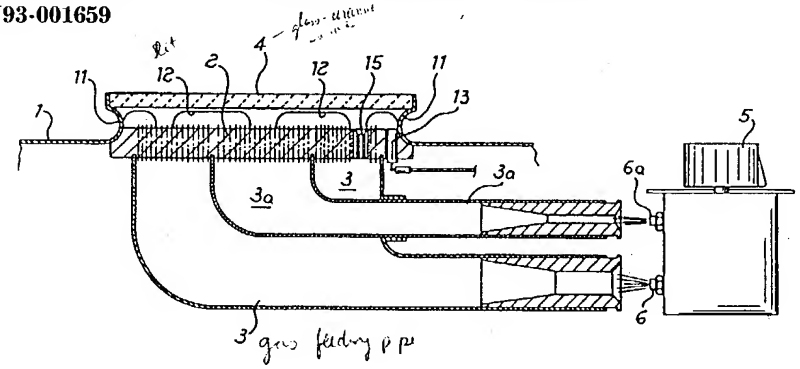

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(54) Infrared radiating gas burners for glass-ceramics cooking decks.

(57) A gas burner capable of emitting infrared radiation for a glass-ceramics plate is fed with gas through a single twin outlet valve adapted to modulate continuously the gas flowrate. Exhaust gases are discharged at the burner outer edge through peripheral slits underneath the heating plate, whereby the heating efficiency is increased through re-use of the combustion exhaust gases. The heating plate, and in particular the plate area confronting the burner, is divided in two separate areas having a common centerline, each receiving gas from a corresponding outlet port, under control of the respective control knob. Of course, on the same glass-ceramics deck more than one burner may be provided, for instance four of them, each one pertaining to a particular cooking area, possibly of different size and heating power.

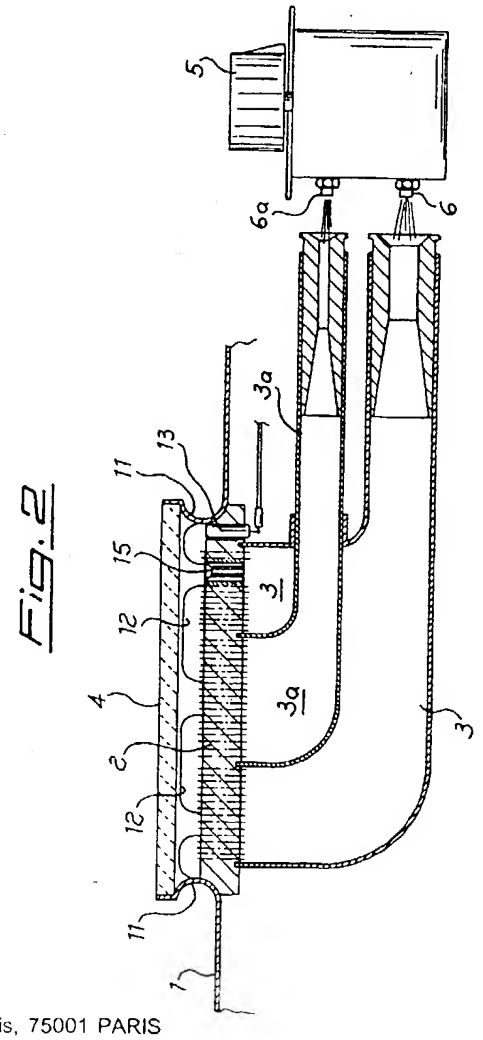

Fig. 2

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This invention concerns a gas burner for heating by means of infrared radiation, for glass-ceramics cooking decks both flush-mounted and free standing. Gas burners are already known in which the flame, rather than being free like in conventional stoves and cooking decks, is generated within an infrared radiating body lined with a glass-ceramics plate, whereby heating takes place through infrared radiation and thermal conduction from said plate, without requiring support grills for the cooking containers as it is the case instead for the free flame burners, whereby the cooking deck can be cleaned faster and more accurately.

However, in the presently known apparatus of this kind few drawbacks are still present, caused by both an excessive overall height required and by an attainable efficiency which is positively not high. In fact, for discharging the exhaust gases deriving from gas combustion, there is normally provided a forced ventilation exhaust arrangement which, besides a complication of the burner structure, causes inevitable obstructions with its components, and directs said exhaust gases towards the back side of the cooking deck, where they are exhausted to the environment. In such a way a portion of the heat content provided by gas combustion gets wasted to the environment and cannot be utilized.

In addition, thermal radiation is mainly generated by the area of the radiating body (normally made of steatite) which is directly impinged on by the flames, whereby the heat distribution on the whole surface of the glass-ceramics plate does not take place in a desirable uniform fashion.

It is true that, in trying to improve the burner thermal efficiency, an arrangement has sometimes been adopted having openings in said glass-ceramics plate, in order to create a better contact between the bottom of the cooking container and the generated heat, but in this case there is still a need for pot-supporting grilles and the cleaning of the cooking deck becomes more difficult, whereby the typical advantages of the glass-ceramics decks must be renounced.

There has now been contrived, and it makes the subject of this invention, a burner having the general features described above, by use of which it is possibile to overcome the above drawbacks of the state of the art. The burner of this invention is characterized by having a natural effect exhaust arrangement for gas combustion exhaust gases, without forced ventilation, through slits cut in the metal sheet (stainless steel or enamelled) of the cooking deck, in the fillet area with the glass-ceramics plate. In this way, in addition to obtaining a lower overall height of the burner, the combustion exhaust gases, before discharging to the environment, flow around the bottom of the cooking container resting on the plate, and they transfer thereto, by a convection effect, an additional portion of the heat which otherwise would be lost.

Furthermore, still according to this invention, the gas flow reaching the burner can be continuously controlled, from a minimum value to a maximum (contrary to available practice for the glass-ceramics cooking decks presently on the market, which work on an "on-off" basis with electronic monitoring of the flame) in that there is provided a flowrate control valve, preferably a double outlet one, for directing separate gas flows to a central area and to a peripheral area of the burner, so that the combustion-generated heat may be distributed in a more uniform fashion.

Advantages of a simpler and more space-effective construction are obtained in this way, together with a higher thermal efficiency by using the heat of the combustion exhaust gases, without renouncing the typical advantages of the glass-ceramics cooking decks and without having to use support grilles or in any way worsen the maintenance conditions of said deck.

The above and further objects, features and advantages of the burner of this invention will become more apparent from the following detailed description of a preferred embodiment thereof, reported herein for exemplary and non limiting purposes, referring to the attached drawings, wherein:

Figure 1 is a top plan view of a burner according to this invention, and

Figure 2 is a cross-sectional view along line II-II of Figure 1.

Referring now to the drawings, the burner, which is mounted on a cooking deck 1, normally enamelled metal sheet or stainless steel, includes an infrared radiating body 2, comprised for instance of steatite, and having the outlet of at least one gas feeding pipe 3 therewithin. As it is known, when a flame induced by a small ignition spark-plug 13, for instance a piezoelectric one, controlled from outside, impinges on said body 2, the latter begins to generate infrared radiations, with well known heating properties, different and in some respect even better than the ones of the free flame. In the embodiment shown herein, two gas feeding pipes are provided, i.e. an inner pipe 3a separated from the outer one shown at 3. Each of them is fed through a respective outlet port 4 and 4a of a single valve 5. It should be noted that pipe 3a, which is provided to feed the burner central area, has a smaller cross-section compared to pipe 3 whose end portion, close to the combustion area, coaxially surrounds inner pipe 3a, as it is perhaps more apparent from the plan view of Figure 1. There is shown at 4 the upper glass-ceramics plate which joins metal deck 1 through a fillet arrangement of the latter, shown at 11 and having, all around the cooking plate 4, a number of slits 12. At 15 there is shown schematically in section, one of the fastening blocks of radiating body 2.

From the above description, and from looking at

the drawing, it should be apparent that, there being no electronic control provided for the flame, which is continuously controlled through valve 5, preferably in parallel in the peripheral region and in the central one, by means of the pair of outlets 6 and 6a and since, furthermore, no forced ventilation devices are present, but simply a number of slits for natural discharge of combustion exhaust gases to the environment, the overall height underneath deck 1 can be reduced to about 40 mm for the embodiment shown, having a double outlet valve, and even all the way down to 30 mm when a single outlet is provided. Of course this is of advantage in that it does not pose any difficulty to the possibility of flush-mounting other appliances, like for instance an oven, in the same piece of furniture from the front side thereof. Looking at Fig. 2 it is then apparent how the exhaust gases, coming out through slits 12 (as shown schematically by the radially directed arrows) may impinge on the bottom of a cooking container lying on plate 4, particularly if the former has a larger diameter than the latter, whereby the heat transfer is enhanced by a convective component, and as a consequence the heating efficiency of the burner is improved.

Eventually, it should be noted that a magnetothermal safety device may be provided, on both heating regions 3 and 3a, by using suitable light emitting warning members (not shown) indicating the presence of residual heat in the plate after the burner has been turned off.

It should eventually be added that the inventive burner may of course be used where more than one cooking area is provided, for instance in a four burner arrangement wherein each burner is controlled by means of a single knob 5.

Claims

1. A gas burner capable of emitting infrared radiation for glass-ceramics cooking decks including an infrared radiating body (2), mounted on a metal deck (1) and covered by a glass-ceramics surface (4), within said body (2) there being provided the outlet of at least one gas feeding pipe (3, 3a) controlled through a corresponding control knob (5), characterized in that the combustion area, which coincides with the outlet of said pipe (3, 3a) at the position of body (2), is communicated to the environment through slits (12) uniformly distributed on a peripheral wall (11) of said burner.

2. The burner of claim 1, characterized in that said slits (12) are cut through an upwardly bent portion of said metal deck (1) providing a fillet and support portion for said plate (4) and radiating body (2), whereby the combustion exhaust gases coming out of said slits (12) are radially directed, and initially they flow parallel to said deck (1).

3. The burner of claim 1 or 2, characterized in that said gas flowrate control valve (5) has a double outlet port (6, 6a) for feeding two separate pipes (3, 3a) adapted to heat independent areas of plate (4).

4. The burner of claim 3, characterized in that one of said pipes (3a), at least in the outlet area thereof close to body (2), lies internally and coaxially within said second pipe (3) which is provided to feed the peripheral area of the burner.

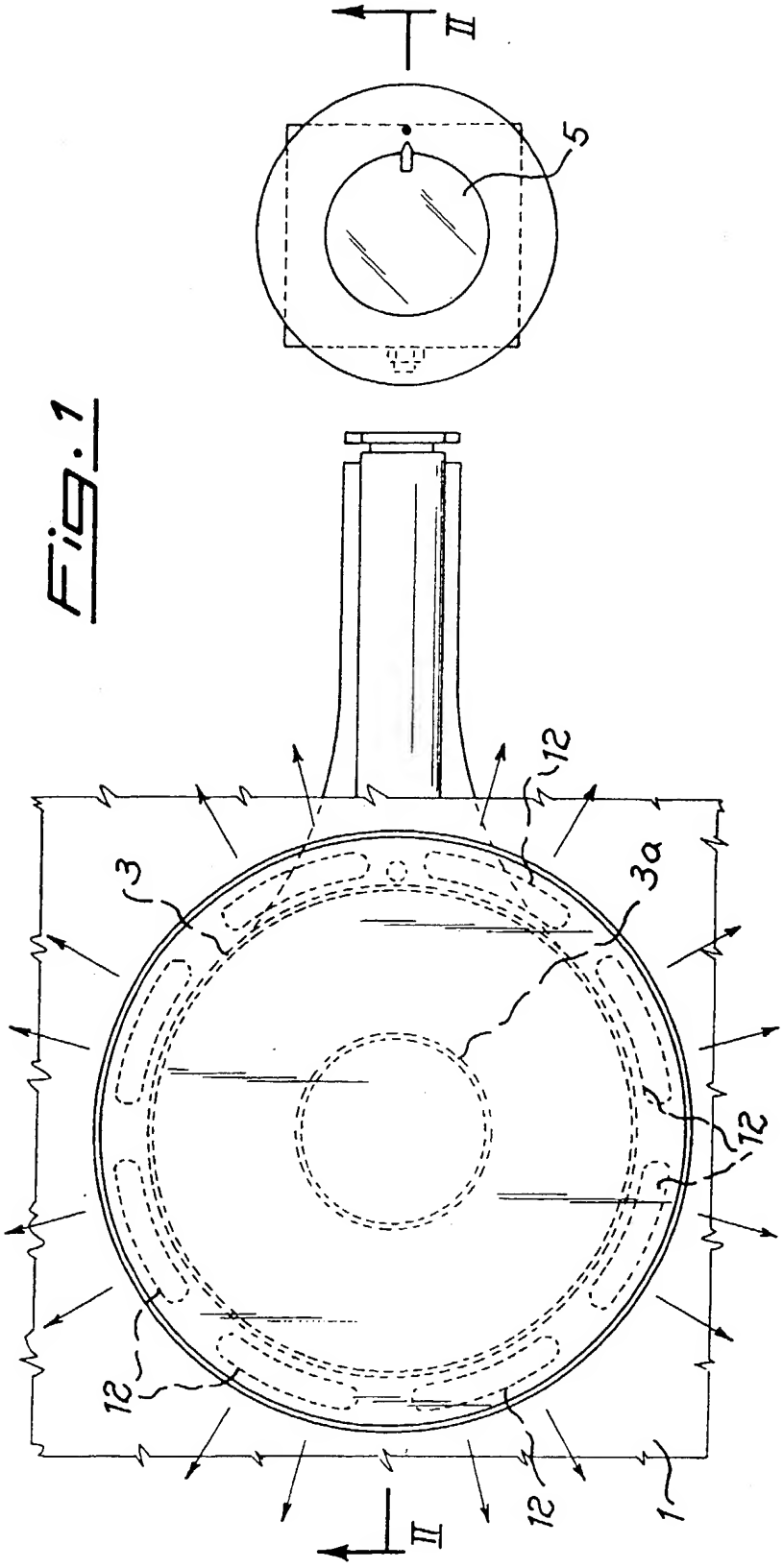
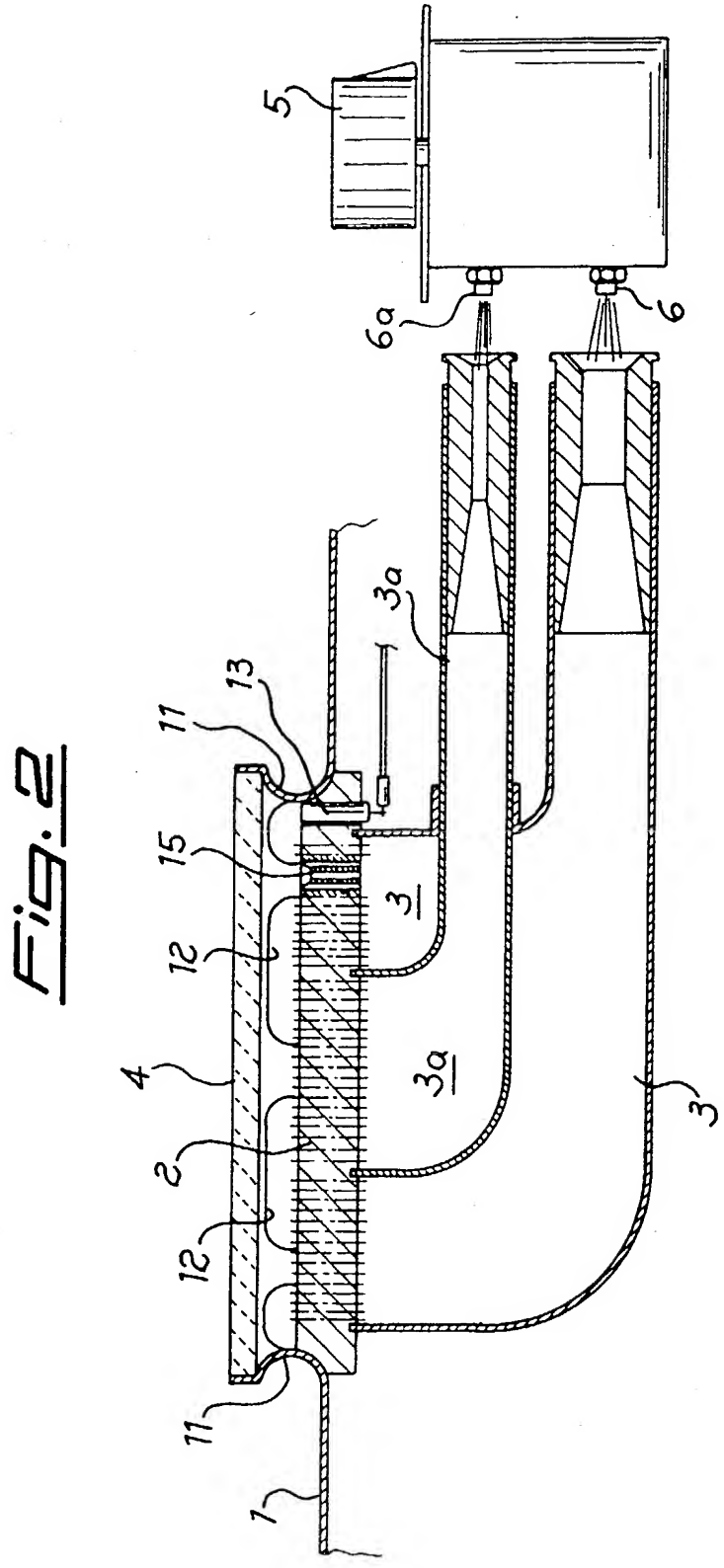


Fig. 1

Fig.2



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EUROPEAN SEARCH REPORT

Application Number
EP 92 83 0342

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	FR-A-2 082 312 (ANTARGAZ) * page 3, line 26 - page 4, line 5; claim 1; figures *	1,3,4	F24C3/06
Y	US-A-3 843 313 (HELGESON) * the whole document *	1,3,4	
A	US-A-3 830 216 (DODD)	1	
A	FR-A-2 340 671 (PHILIPS GLOEILAMPENFABRIEKEN)	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06 OCTOBER 1992	VANHEUSDEN J.

CATEGORY OF CITED DOCUMENTS

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